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[Continued.]

understood than in Massachusetts, and the free discussions which have of late been held, in county and town meetings, have had the effect to call the attention of the public to it; and I trust the time is not far distant, when, at least in Massachusetts, the *Common School system* will accomplish all the good which it is capable of producing. Why do we not, in these United States, have a revolution, almost annually, as in the republics of South America? Ignorance and vice always have invited, and always will invite, such characters as Shakspeare's Jack Cade to rule over them. And may we not feel an assurance, that in proportion as the nation shall recover from the baneful influence of intemperance, so will its attention be directed preëminently to the promotion of virtue and knowledge, and that nowhere in our country will an incompetent or intemperate Common School teacher be intrusted with the education of our children?"

These are a fair specimen, and no more than a fair specimen, of a mass of facts which I have obtained from the most authentic sources. They seem to prove incontestably that education is not only a moral renovator, and a multiplier of intellectual power, but that it is also the most prolific parent of material riches. It has a right, therefore, not only to be included in the grand inventory of a nation's resources, but to be placed at the very head of that inventory. It is not only the most honest and honorable, but the surest means of amassing property. A trespasser or a knave may forcibly or fraudulently appropriate the earnings of others to himself; but education has the prerogative of originating or generating property, more certainly and more rapidly than it was ever accumulated by force or fraud. It has more than the quality of an ordinary mercantile commodity, from which the possessor realizes but a single profit as it passes through his hands;—it rather resembles fixed capital, yielding constant and high revenues. As it enjoys an immunity from common casualties, it incurs no cost for insurance or defence. It is above the reach of changes in administration, or in administrational policy; and it is free from those fluctuations of trade which agitate the market, and make it so frequent an occurrence, that a merchant who goes to bed a man of wealth at night, rises a pauper in the morning. Possessing these qualities, it has the highest economical value, and although statesmen who assail or defend, who raise up or put down, systems of commercial, manufacturing, or agricultural policy, have seldom or never deigned to look at education as the grand agent for the development or augmentation of national resources, yet it measures the efficacy of every other means of aggran-

dizement, and is more powerful in the production and gainful employment of the total wealth of a country, than all other things mentioned in the books of the political economist. Education is an antecedent agency, for it must enlighten mankind in the choice of pursuits; it must guide them in the selection and use of the most appropriate means; it must impart that confidence and steadiness of purpose which result from comprehending the connections of a long train of events, and seeing the end from the beginning, or all enterprises will terminate in ruin.

Considering education, then, as a producer of wealth, it follows that the more educated a people are, the more will they abound in all those conveniences, comforts, and satisfactions, which money will buy; and, other things being equal, the increase of competency and the decline of pauperism will be measurable on this scale. There are special reasons giving peculiar force to these considerations in the State of Massachusetts. Our population is principally divided into agriculturists, manufacturers, and mechanics. We have no *idle* class,—no class born to such hereditary wealth as supersedes the necessity of labor, and no class subsisting by the services of hereditary bondmen. All, with exceptions too minute to be noticed, must live by their own industry and frugality. The master and the laborer are one; and hence the necessity that all should have the health and strength by which they can work, and the judgment and knowledge by which they can plan and direct. The muscle of a laborer and the intelligence of an employer must be united in the same person.

Education and Agriculture.—The healthful and praiseworthy employment of Agriculture requires knowledge for its successful prosecution. In this department of industry, we are in perpetual contact with the forces of nature. We are constantly dependent upon them for the pecuniary returns and profits of our investments; and hence the necessity of knowing what those forces are, and under what circumstances they will operate most efficiently, and will most bountifully reward our original outlay of money and time. In the presence of the savage, the exuberance of nature may cover the earth with magnificent forests, through whole degrees of latitude and longitude, and clothe and beautify it with the grasses and flowers of the prairie, to whose ocean-like expanse the eye can discover no shore,—magnificent and poetic spectacles, indeed,—yet, for the sustentation of human life, for the existence and extension of human happiness, almost valueless. But under the art of agriculture, which is only another name for the knowledge of natural powers, millions are feasted on a territory where, before, a hundred starved. Perhaps there is no spot in the world of such limited extent, where there is a greater variety of agricultural productions than in Massachusetts. This brings into requisition all that chemical and experimental knowledge which pertains to the rotation of crops, and the enrichment of soils. If rotation be disregarded, the repeated demand upon the same soil to produce the same crop, will exhaust it of the elements on which that particular crop will best thrive; and if its chemical ingredients and affinities are not understood, an attempt may be made to reënforce it by substances with which it is already surcharged, instead of renovating it with those of which it has been exhausted by previous growths. But for these ar-

rangements and adaptations, knowledge is the grand desideratum; and the addition of a new fact to a farmer's mind, will often increase the amount of his harvests more than the addition of acres to his estate. Why is it, that, if we except Egypt, all the remaining territory of Africa, containing nearly ten millions of square miles, with a soil, most of which is incomparably more fertile by nature, produces less for the sustenance of man and beast, than England, whose territory is only fifty thousand square miles? In the latter country, knowledge has been a substitute for a genial climate and an exuberant soil; while in the former, it is hardly a figurative expression to say, that all the maternal kindness of Nature, powerful and benignant as she is, has been repulsed by the ignorance of her children. Doubtless, industry as well as knowledge is indispensable to productiveness; but knowledge must precede industry, or the latter will work to so little effect as to become discouraged, and to relapse into the slothfulness of savage life. But, without further exposition, it may be remarked generally, that the spread of intelligence, through the instrumentality of good books, and the cultivation in our children of the faculties of observing, comparing, and reasoning, through the medium of good schools, would add millions to the agricultural products of the Commonwealth, without imposing upon the husbandman an additional hour of labor. It would be as foolish for us as for the African, to suppose that we have reached the ultimate boundary of improvement.

Education and the Useful Arts.—In regard to another branch of industry, the State of Massachusetts presents a phenomenon which, all things being considered, is unequalled in any part of the world. I refer to the distribution or apportionment of its citizens, among the different departments of labor. With a population of only eighty-seven thousand engaged in agriculture, we have eighty-five thousand engaged in manufactures and trades. The proportion, therefore, in this State, of the latter to the former, is almost as one to one, while the proportion for the whole Union falls but a fraction below one to five. If to the eighty-five thousand engaged in manufactures and trades, are added the twenty-seven, (almost twenty-eight,) thousand employed in navigating the ocean, and to whom, as a class, the succeeding views are, to a great extent, applicable, we shall find that the capital and labor of the State embarked in the latter employments, far exceed those devoted to agricultural pursuits.

Now, for the successful prosecution,—it may almost be said, for the very existence amongst us of the manufacturing and mechanic arts, there must be, not only the exactness of science, but also exactness or skill in the application of scientific principles, throughout the whole processes, either of constructing machinery, or of transforming raw materials into finished fabrics. This ability to make exact and skilful applications of science to an unlimited variety of materials, and especially to the subtile but most energetic agencies of nature, is one of the latest attainments of the human mind. It is remarkable that astronomy, sculpture, painting, poetry, oratory, and even ethical philosophy, had made great progress, thousands of years before the era of the manufacturing and mechanic arts. This era, indeed has but just commenced; and already, the abundance, and,—what is of far greater

importance,—the universality of personal, domestic, and social comforts it has created, constitute one of the most important epochs in the history of civilization. The cultivation of these arts is conferring a thousand daily accommodations and pleasures upon the laborer in his cottage, which, only two or three centuries ago, were luxuries in the palace of the monarch. Through circumstances incident to the introduction of all economical improvements, there has hitherto been great inequality in the distribution of their advantages, but their general tendency is greatly to ameliorate the condition of the mass of mankind. It has been estimated that the products of machinery in Great Britain, with a population of eighteen millions, is equal to the labor of hundreds of millions of human hands. This vast gain is effected without the conquest or partitioning of the territory of any neighboring nation, and without rapine or the confiscation of property already accumulated by others. It is an absolute creation of wealth,—that is, of those articles, commodities, improvements, which we appraise and set down, as of a certain moneyed value, alike in the inventory of a deceased man's estate, and in the grand valuation of a nation's capital. These contributions to human welfare have been derived from knowledge,—from knowing how to employ those natural agencies, which from the beginning of the race had existed, but had lain dormant, or run uselessly away. For mechanical purposes, what is wind, or water, or the force of steam worth, until the ingenuity of man comes in, and places the wind-wheel, the water-wheel, or the piston, *between* these mighty agents and the work he wishes them to perform? But after the invention and intervention of machinery, how powerful they become for all purposes of utility! In a word, these great improvements which distinguish our age from all preceding ages, have been obtained from Nature, by addressing her in the language of Science and Art,—the only language she understands,—yet one of such all-prevailing efficacy that she never refuses to comply to the letter with all petitions for wealth or physical power, if they are preferred to her in that dialect.

Now, it is easy to show, from reasoning, from history, and from experience, that an early awakening of the mind is a prerequisite to success in the useful arts. It must be an awakening, not to feeling merely, but to thought. In the first place, a clearness of perception must be acquired, or the power of taking a correct mental transcript, copy, or image, of whatever is seen. This, however, though indispensable, is by no means sufficient. It may answer for mere automatic movements,—for the servile copying of the productions of others. The Chinese excel in imitations of this kind; but, as they have little inventive genius, the learner echoes the teacher, the apprentice repeats the master; and thus the human mind, for generation after generation, presents the monotonous aspects of a revolving cylinder, which turns up the same phases at each successive revolution. But the talent of improving upon the labors of others, requires not only the capability of receiving an exact mental copy or imprint of all the objects of sense or reasoning;—it also requires the power of reviving or reproducing, at will, all the impressions or ideas before obtained, and, also, the power of changing their collocations, of reärranging them into new forms, and of adding something to, or removing something from, the original perceptions, in order to make a more perfect plan or model. If a ship-

wright, for instance, would improve upon all existing specimens of naval architecture, he would first examine as great a number of ships as possible;—this done, he would revive the image which each one had imprinted upon his mind; and, with all the fleets which he had inspected present to his imagination, he would compare each individual vessel with all the others, make a selection of one part from one, and of another part from another, apply his own knowledge of the laws of moving and of resisting forces to all, and thus create in his own mind the complex idea or model of a ship, more perfect than any of those he had seen. Now, every recitation in a school, if rightly conducted, is a step towards the attainment of this wonderful power. With a course of studies judiciously arranged, and diligently pursued through the years of minority, all the great phenomena of external nature, and the most important productions in all the useful arts, together with the principles on which they are evolved or fashioned, would be successively brought before the understanding of the pupil. He would thus become familiar with the substances of the material world, and with their manifold properties and uses; and he would learn the laws, —comparatively few,—by which results, infinitely diversified, are produced. When such a student goes out into life, he carries, as it were, a plan or model of the world in his own mind. He cannot, therefore, pass, either blindly or with the stupid gaze of the brute creation, by the great objects and processes of nature; but he has an intelligent discernment of their several existences and relations, and their adaptation to the uses of mankind. Neither can he fasten his eye upon any workmanship or contrivance of man, without asking two questions,—first, How is it? and, secondly, How can it be improved? Hence, he has as great an advantage over an ignorant man, as one traveller, in a foreign country, who is familiar with the language of the people where he is journeying, has over another, incapable of understanding a word that he hears. The one, also, carries a map of the whole country in his hand, while the other is without path or guide. Hence it is, too, that all the processes of nature, and the contrivances of art, are so many lessons or communications to an instructed man; but an uninstructed one walks in the midst of them like a blind man amongst colors, or a deaf man amongst sounds. The Romans carried their aqueducts from hill-top to hill-top on lofty arches, erected at an immense expenditure of time and money. One idea,—that is, a knowledge of the law of the equilibrium of fluids,—a knowledge of the fact that water in a tube will rise to the level of the fountain,—would have enabled a single individual to do with ease what, without that knowledge, it required the wealth of an empire to accomplish.

It is in ways similar to this,—that is, by accomplishing greater results with less means; by creating products, at once cheaper, better, and by more expeditious methods; and by doing a vast variety of things, otherwise impossible,—that the cultivation of mind may be truly said to yield the highest pecuniary requital. Intelligence is the great money-maker,—not by extortion, but by production. There are ten thousand things in every department of life, which, if done in season, can be done in a minute, but which, if not seasonably done, will require hours, perhaps days or weeks, for their performance. An awakened mind will see and seize the critical juncture; the perceptions of a sluggish one will come too late, if they come at all.

A general culture of the faculties, also, gives versatility of talent, so that if the customary business of the laborer is superseded by improvements, he can readily betake himself to another kind of employment; but an uncultivated mind is like an automaton which can do only the one thing for which its wheels or springs were made. Brute force expends itself unproductively. It is ignorant of the manner in which Nature works, and hence it cannot avail itself of her mighty agencies. Often, indeed, it attempts to oppose Nature. It throws itself across the track where her resistless car is moving. But knowledge enables its possessor to employ her agencies in his own service, and he thereby obtains an amount of power, without fee or reward, which thousands of slaves could not give. Every man who consumes a single article, in whose production or transportation the power of steam is used, has it delivered to him cheaper than he could otherwise have obtained it. Every man who can avail himself of this power, in travelling, can perform the business of three days in one, and so far, add two hundred per cent. to the length of his life, as a business man. What innumerable millions has the invention of the cotton-gin, by Whitney, added, and will continue to add, to the wealth of the world!—a part of which is already realized, but vastly the greater part of which is yet to be received, as each successive day draws for an instalment which would exhaust the treasury of a nation. The instructed and talented man enters the rich domains of Nature, not as an intruder, but, as it were, a proprietor, and makes her riches his own.

And why is it that, so far as this Union is concerned, four fifths of all the improvements, inventions, and discoveries, in regard to machinery, to agricultural implements, to superior models in ship-building, and to the manufacture of those refined instruments on which accuracy in scientific observations depends, have originated in New England? I believe no adequate reason can be assigned, but the early awakening and training of the power of thought in our children. The suggestion is not made invidiously, but in this connection it has too important a bearing to be omitted,—but let any one, who has resided or travelled in those States where there are no Common Schools, compare the condition of the people at large, as to thrift, order, neatness, and all the external signs of comfort and competence, with the same characteristics of civilization in the farm-houses and villages of New England. These contrasts exist, notwithstanding the fertility of the soil and the abundance of mineral resources, in the former States, as compared with the sterile surface and granite substratum of the latter. Never was a problem more clearly demonstrated than that even a moderate degree of intelligence, diffused through the mass of the people, is more than an equivalent for all the prodigality of Nature. It is said, indeed, in regard to those States where there are no provisions for general education, that the want of energy and forecast, the absence of labor-saving contrivances, and an obtuseness in adapting means to ends, are the consequences of a system of involuntary servitude; but what is this, so far as productiveness is concerned, but a want of knowledge,—what is it but the existence of that mental imbecility and torpor, which arise from personal and hereditary neglect? In conversing with a gentleman who had possessed most extensive opportunities for acquaintance with men of different countries and of all degrees of intellectual de-

velopment, he observed that he could employ a common immigrant or a slave, and if he chose, could direct him to shovel a heap of sand from one spot to another, and then back into its former place, and so to and fro, through the day; and that, with the same food or the same pay, the laborer would perform this tread-mill operation without inquiry or complaint; but, added he, neither love nor money would prevail on a New Englander to prosecute a piece of work of which he did not see the utility. There is scarcely any kind of labor, however simple or automatic, which can be so well performed without knowledge in the workman, as with it. It is impossible for an overseer or employer, at all times, to supply mind to the laborer. In giving directions for the shortest series or train of operations, something will be omitted or misunderstood; and without intelligence in the workman, the omission or the mistake will be repeated in the execution.*

It is a fact of universal notoriety, that the manufacturing population of England, as a class, work for half, or less than half, the wages of our own. The cost of machinery there, also, is but about half as much as the cost of the same articles with us; while our capital, when loaned, produces nearly double the rate of English interest. Yet, against these grand adverse circumstances, our manufacturers, with a small per centage of tariff, successfully compete with English capitalists, in many branches of manufacturing business. No explanation can be given of this extraordinary fact, which does not take into the account the difference of education between the operatives in the two countries. Yet where, in all our Congressional debates upon this subject, or in the discussions and addresses of National Conventions, has this fundamental principle been brought out,—and one, at least, of its most important and legitimate inferences displayed, viz., that it is our wisest policy, as citizens,—if indeed it be not a duty of self-preservation, as men,—to improve the education of our whole people, both in its quantity and quality? I have been told by one of our most careful and successful manufacturers, that on substituting, in one of his cotton-mills, a better for a poorer educated class of operatives, he was enabled to add twelve or fifteen per cent. to the speed of his machinery, without any increase of damage or danger from the acceleration. How direct and demonstrative the bearing which facts like this have upon the wisdom of our

* It once happened to me, while travelling in one of the South-Western States, to visit an edifice of a public character, then almost completed. The building had a great number of apartments, which were to be warmed by means of a furnace placed in the cellar, after the manner in which most of our hospitals and large public edifices are warmed. Accordingly, one set of flues had been constructed for conveying the heated and pure air into all the apartments, and another set for conveying the foul air upward into the attic. So far it was well. But unfortunately for the transmission of the air in an upward current, and for its escape from the attic when it should arrive there, the roof was completely closed in, neither window, sky-light, nor aperture of any kind, being left, through which it could find egress. The edifice had been built *from a plan*, and without a knowledge of principles. I regret to add that it was a State institution, and had been erected under a Board of Commissioners appointed by the Executive; and much delay, and probably great suffering, were endured before the building could be fitted for the reception and occupancy of any class of beings dependent on breathing for existence. This was a very striking case; but every unintelligent man will make mistakes every day of his life, which are as important to him, and perhaps as ludicrous in the sight of others, as was this attempt of a Commonwealth, to ventilate a building where sixty or seventy persons were constantly to reside, by packing all the impure air snugly away in the garret! Nature will not abate one tittle of her laws, even to the mightiest earthly sovereign; but when the humblest individual obtains a knowledge of their exact and immutable operations, she protects him with her ægis, and enriches him with all her bounties.

law respecting the education of children in manufacturing establishments! What prominency and cogency do they give to the argument for obeying it, if not from motives of humanity, at least from those of policy and self-interest! I am sorry to say that this benignant and parental law is still, in some cases, openly disregarded; and that there are employers amongst us, who say, that if their hands come punctually to their work, and continue at it during the regular hours, it is immaterial to them what private character they sustain, and whether they attend the evening school or the lyceum lecture on the week-day, or go to church on the Sabbath.

The number of females in this State, engaged in the various manufactures of cotton, straw-platting, &c., has been estimated at forty thousand; and the annual value of their labor, at one hundred dollars each, on an average, or four millions of dollars for the whole. From the facts stated in the letters of Messrs. Mills and Clark, above cited, it appears that there is a difference of not less than fifty per cent. between the earnings of the least educated and of the best educated operatives, —between those who make their marks, instead of writing their names, and those who have been acceptably employed in school-keeping. Now, suppose the whole forty thousand females engaged in the various kinds of manufactures in this Commonwealth, to be degraded to the level of the lowest class, it would follow that their aggregate earnings would fall, at once, to two millions of dollars. But, on the other hand, suppose them all to be elevated by mental cultivation to the rank of the highest, and their earnings would rise to the sum of six millions of dollars, annually.

I institute no comparison in regard to the company imported from England, (of whom an account is given in the letter of Mr. Mills,) who, though accustomed to work in the mills of Manchester, could not earn their living here.

These remarks, in regard to other States or countries, emanate from no boastful or vainglorious spirit. They come from a very different mood of mind, for I have the profoundest conviction,—and could fill much space with facts that would justify it,—that other communities do not fall short of our own, so much as we fall short of what we might easily become.

A few instances, of a familiar kind, exemplifying the axiom that "knowledge is power," will close this Report.

M. Redelet, in his work *Sur l'Art de Bâtir*, gives the following account of an experiment made to test the different amounts of force, which, under different circumstances, were necessary to move a block of squared granite, weighing 1080 pounds.

In order to move this block along the floor of a roughly chiselled quarry, it required a force equal to 758 lbs.

To draw the same stone over a floor of planks, it required a force equal to 652 lbs.

Placed on a platform of wood, and drawn over the same floor, it required 606 lbs.

By soaping the two surfaces of wood, the requisite force was reduced to 182 lbs.

Placed on rollers, of three inches' diameter, and a force equal to 34 lbs. was sufficient.

Substituting a wooden for a stone floor, and the requisite force was 28 lbs.

With the same rollers on a wooden platform, it required a force equal to 22 lbs. only.

At this point, the experiments of M. Redelet stopped. But, by improvements since effected, in the invention and use of locomotives on railroads, a traction or draught of eight pounds is sufficient to move a ton of 2240 lbs.,—so that a force of less than four pounds would now be sufficient to move the granite block of 1080 lbs.;—that is, one hundred and eighty-eight times less than was required in the first instance. When, therefore, mere animal or muscular force was used to move the body, it required about two thirds of its own weight to accomplish the object; but, by adding the contrivances of *mind* to the strength of *muscle*, the force necessary to move it is reduced more than one hundred and eighty-eight times. Here, then, is a partnership, in which *mind* contributes one hundred and eighty-eight shares to the stock, to one share contributed by *muscle*;—or, while *brute strength* represents one man, *ingenuity* or *intelligence* represents one hundred and eighty-eight men!

Dr. Potter, in his late work, entitled "The Principles of Science, applied to the Domestic and Mechanic Arts, and to Manufactures and Agriculture," has the following, p. 29, *n.*:—

"The increasing powers of the steam-loom are shown in the following statement, furnished by a manufacturer.

"'A very good *hand weaver*, twenty-five or thirty years of age, will weave *two* pieces of 9-8ths shirting a week.

"'In 1823, a *steam-loom weaver*, about fifteen years of age, attending two looms, could weave *seven* similar pieces in a week.

"'In 1826, a *steam-loom weaver*, about fifteen years of age, attending two looms, could weave *twelve* similar pieces in a week; some could weave *fifteen* pieces.

"'In 1833, a *steam-loom weaver*, from fifteen to twenty years of age, assisted by a girl about twelve years of age, attending four looms, could weave *eighteen* similar pieces in a week; some could weave *twenty* pieces.'"

Here, then, during a period of only ten years, the application of *mind* to a particular branch of business, enabled a lad of fifteen years of age, assisted by a girl of twelve, to do from nine to ten times as much work as had before been done by an accomplished and mature workman.

In the manufacture of needles, a number equal to twenty thousand is thrown promiscuously into a box, mingled heads and points, and crossing each other in every possible direction. This happens several times during the various stages of manufacturing needles; and, in each case, it is necessary to arrange them lengthwise, or in a parallel direction. One would suppose, beforehand, that the picking out of twenty thousand needles entangled together, and forming, as it were, one great iron bur, and placing them all in a parallel direction, would be a formidable task, even for a week; and, also, that the operator would need some insurance on the ends of his fingers, or be obliged to submit to a very uncomfortable species of blood-letting. But, by a simple and ingenious contrivance, aided by a little sleight of hand, the work is done

in a few minutes. It is unnecessary to inquire how much such ingenuity diminishes the price of needles, because, without it, there would be no needles at any price.

Not more than thirty years ago, it was uncommon for a glazier's apprentice, even after having served an apprenticeship of seven years, to be able to cut glass with a diamond, without spending much time, and destroying much of the glass upon which he worked. The invention of a simple tool has put it in the power of the merest tyro in the trade to cut glass with facility and without loss. A man, who had a *mind as well as fingers*, observed that there was one direction in which the diamond was almost incapable of abrasion or wearing by use. The tool not only steadies the diamond, but fastens it in that direction.

The lathe, the old-fashioned spinning-wheel, and the loom, by having a treadle for the foot, became equal to the addition of another hand to the workman.*

The operation of tanning leather consists in exposing a hide to the action of a chemical ingredient called tannin, for a length of time sufficient to allow every particle of the hide to become saturated with the solution. In making the best leather, the hides used to lie in the pit for six, twelve, or eighteen months, and sometimes for two years;—the tanner being obliged to wait all this time for a return of his capital. By the modern process, the hides are placed in a close pit, with a solution of the tannin-matter; and the air being exhausted, the liquid penetrates through every pore and fibre of the skin, and the whole process is completed in a few days.

The bleaching of cloth, which used to be effected in the open air and in exposed situations where a temptation to theft was offered, (and in England, hundreds and probably thousands of men have yielded, and forfeited their lives,) is now performed in an unexposed situation, and in a manner so expeditious, that cloth is bleached as much more rapidly than it formerly was, as hides are tanned.

* "Without tools, that is, by the mere efforts of the human hand, there are, undoubtedly, multitudes of things which it would be impossible to make. Add to the human hand the rudest cutting instrument, and its powers are enlarged;—the fabrication of many things then becomes easy, and that of others possible, with great labor. Add the saw to the knife or the hatchet, and other works become possible, and a new course of difficult operations is brought into view, whilst many of the former are rendered easy. This observation is applicable even to the most perfect tools or machines. It would be *possible* for a very skilful workman, with files and polishing substances, to form a cylinder out of a piece of steel; but the time which this would require, would be so considerable, and the number of failures would, probably, be so great, that, for all practical purposes, such a mode of producing a steel cylinder might be said to be impossible. The same process, by the aid of the lathe and the sliding-rest, is the every-day employment of hundreds of workmen."—*Babbage on the Economy of Machinery and Manufactures.*

"The earliest mode of cutting the trunks of a tree into planks, was by the use of the hatchet or the adze. It might, perhaps, be first split into three or four portions, and then each portion was reduced to a uniform surface by those instruments. With such means, the quantity of plank produced would, probably, not equal the quantity of the raw material wasted by the process; and, if the planks were thin, would certainly fall short of it. An improved tool, the *saw*, completely reverses the case. In converting a tree into thick planks, it causes the waste of a very small fractional part; and, even in reducing it to planks of only an inch in thickness, it does not waste more than an eighth part of the raw material. When the thickness of the plank is still further reduced, as is the case in cutting wood for veneering, the quantity of material destroyed again begins to bear a considerable proportion to that which is used; and hence, circular saws, having a very thin blade, have been employed for such purposes. In order to economize, still further, the more valuable woods, Mr. Brunel contrived a machine which, by a system of blades, cut off the veneer in a continuous shaving, thus rendering the whole of the piece of timber available."—*Id.*

It is stated by Lord Brougham, in his beautiful "Discourse on the Advantages of Science," that the inventor of the new mode of refining sugar, made more money in a shorter time, and with less risk and trouble, than perhaps was ever realized from any previous invention.

Intelligence, also, prevents loss, as well as makes profits. How much time and money have been squandered in repeated attempts to invent machinery, after a principle had been once tested, and had failed through some defect, inherent and natural, and therefore insuperable! Within thirty years, not less than five patents have been taken out, in England and the United States, for a certain construction of paddle-wheels for a steamboat, which construction was tested and condemned as early as 1810. A case once came within my own knowledge, of a man who spent a fortune in mining for coal, when a work on geology, which would have cost but a dollar, and might have been read in a week, would have informed him that the stratum, where he began to excavate, belonged to a formation, lower down in the natural series than coal ever is, or according to the constitution of things, ever can be found. He therefore worked into a stratum which must have been formed before a particle of coal, or even a tree, or a vegetable, existed on the planet.

These are a few specimens, on familiar subjects, taken almost at random, for the purpose of showing the inherent superiority of any association or community, whether small or great, where *mind* is a member of the partnership. What is true of the above-mentioned cases, is true of the whole circle of those arts, by which human life is sustained, and human existence comforted, elevated, and embellished. Mind has been the improver, for matter cannot improve itself; and improvement has advanced in proportion to the number and culture of the minds excited to activity and applied to the work. Similar advancements have been effected throughout the whole compass of human labor and research; —in the arts of Transportation and Locomotion, from the employment of the sheep and the goat, as beasts of burden, to the steam-engine and the railroad car;—in the art of Navigation, from the canoe clinging timidly to the shore, to steamships which boldly traverse the ocean;—in Hydraulics, from carrying water by hand, in a vessel, or in horizontal aqueducts, to those vast conduits which supply the demands of a city, and to steam fire-engines which throw a column of water to the top of the loftiest buildings;—in the arts of Spinning and Rope-making, from the hand distaff to the spinning frame, and to the machine which makes cordage or cables of any length, in a space ten feet square;—in Horology or Timekeeping, from the sun-dial and the water-clock, to the watch, and to the chronometer, by which the mariner is assisted in measuring his longitude, and in saving property and life;—in the extraction, forging and tempering of Iron and other ores, having malleability to be wrought into all forms, and used for all purposes, and supplying, instead of the stone-hatchet or the fish-shell of the savage, an almost infinite variety of instruments, which have sharpness for cutting, or solidity for striking;—in the arts of Vitrification, or Glass-making, giving not only a multitude of commodious and ornamental utensils for the household, but substituting the window for the unsightly orifice or open casement, and winnowing light and warmth from the outward and the cold atmosphere;—in the arts of Induration by Heat,

from bricks dried in the sun, to those which withstand the corrosion of our climate for centuries, or resist the intensity of the furnace;—in the arts of Illumination, from the torch cut from the fir or pine-tree, to the brilliant gas-light which gives almost a solar splendor to the nocturnal darkness of our cities;—in the arts of Heating and Ventilation, which at once supply warmth for comfort and pure air for health;—in the art of Building, from the hollowed trunk of a tree, or the roof-shaped cabin, to those commodious and lightsome dwellings which betoken the taste and competence of our villages and cities;—in the art of Copying or Printing, from the toilsome process of hand-copying, where the transcription of a single book was the labor of months or years, and sometimes almost of a life, to the power printing-press, which throws off sixty printed sheets in a minute;—in the art of Paper-making, from the preparation of the inner bark of a tree, cleft off, and dried at immense labor, to the machinery of Fourdrinier, from which there jets out an unbroken stream of paper, with the velocity and continuousness of a current of water;—and, in addition to all these, in the arts of Modelling and Casting; of Designing, Engraving, and Painting; of Preserving materials and of Changing their color, of Dividing and Uniting them, &c. &c.,—an ample catalogue, whose very names and processes would fill volumes.

Now, for the perfecting of all these operations, from the tedious and bungling process, to the rapid and elegant;—for the change of an almost infinite variety of crude and worthless materials into useful and beautiful fabrics, *mind* has been the agent. Succeeding generations have outstripped their predecessors, just in proportion to the superiority of their mental cultivation. When we compare different people or different generations with each other, the diversity is so great that all must behold it. But there is the same kind of difference between contemporaries, fellow-townsmen, and fellow-laborers. Though the uninstructed man works side by side with the intelligent, yet the mental difference between them, places them in the same relation to each other, that a past age bears to the present. If the ignorant man knows no more respecting any particular art or branch of business, than was generally known during the last century, he belongs to the last century; and he must consent to be outstripped by those who have the light and knowledge of the present. Though they are engaged in the same kind of work, though they are supplied with the same tools or implements for carrying it on, yet, so long as one has only an arm, but the other has an arm and a mind, their products will come out, stamped and labelled, all over, with marks of contrast;—superiority and inferiority, both as to quantity and quality, will be legibly written on their respective labors. It is related by travellers among savage tribes, that when, by the help of any ingeniously-devised instrument or apparatus, they have performed some skilful manual operation, the savages have purloined from them the instrument they had used, supposing there was some magic in the apparatus itself, by which the seeming miracle had been performed; but, as they could not steal the art of the operator with the implement which he employed, the theft was fruitless. Any person who expects to effect, with less education, what another is enabled to do, with more, ought not to smile at the delusion of the savage, or the simplicity of his reasoning.

On a cursory inspection of the great works of art,—the steam-engine, the printing-press, the power loom, the mill, the iron foundry, the ship, the telescope, &c. &c.,—we are apt to look upon them as having sprung into sudden existence, and reached their present state of perfection by one, or at most by a few mighty efforts of creative genius. We do not reflect that they have required the lapse of centuries, and the successive application of thousands of minds, for the attainment of their present excellence; that they have advanced from a less to a more perfect form, by steps and gradations almost as imperceptible as the growth by which an infant expands to the stature of a man; and that, as later discoverers and inventors had first to go over the ground of *their* predecessors, so must future discoverers and inventors first master the attainments of the present age, before they will be prepared to make those new achievements which are to carry still further onward the stupendous work of improvement.

Amongst a people, then, who must gain their subsistence by their labor, what can be so economical, so provident and far-sighted, and even so wise,—in a lawful and laudable, though not in the highest sense of that word,—as to establish, and, with open heart and hand, to endow and sustain the most efficient system of Universal Education for their children; and, where the material bounties of nature are comparatively narrow and stinted, to explore, in their stead, those exhaustless and illimitable resources of comfort, and competency, and independence, which lie hidden in the yet dormant powers of the human intellect?

But, notwithstanding all I have said of the value of education, in a pecuniary sense, and of its power to improve and elevate the outward domestic and social condition of all men, yet, in closing this report, I should do injustice to my feelings, did I abstain from declaring that to my own mind, this tribute to its worth, however well deserved, is still the faintest note of praise which can be uttered, in honor of so noble a theme;—and that, however deserving of attention may be the *economical* view of the subject which I have endeavored to present, yet it is one that dwindles into insignificance when compared with those loftier and more sacred attributes of the cause, which have the power of converting material wealth into spiritual well-being, and of giving to its possessor lordship and sovereignty, alike over the temptations of adversity, and the still more dangerous seducements of prosperity, and which,—so far as human agency is concerned,—must be looked to for the establishment of peace and righteousness upon earth, and for the enjoyment of glory and happiness in heaven.

HORACE MANN,
Secretary of the Board of Education.

BOSTON, *January* 1, 1842.

A GREAT WORK.—"The education of our children," said John Adams to his wife, "is never out of my mind. Train them to virtue. Habituate them to industry, activity, and spirit. Make them consider every vice as shameful and unmanly. Fire them with ambition to be useful. Make them disdain to be destitute of any useful or ornamental knowledge."

EXTRACT FROM THE LATE MESSAGE OF GOVERNOR PAINE TO THE LEGISLATURE OF VERMONT.

There is nothing which so much promotes the love of order in a community as the diffusion of knowledge, and especially of that knowledge which is early instilled into the mind. Those who are prepared, with sound principles and a good education, for the active scenes of life, can hardly fail to make useful, peaceable, and moral members of society. And those who are not thus prepared, though naturally well inclined, may easily be made instruments of disorder and mischief. Society has, therefore, no security, except in the early education of its members. Self-interest is thus made the means of compelling us to discharge the highest of all duties towards our fellow-men. That portion of our lives, which is employed most profitably for ourselves and our own children, is probably the time we devote to educating the children of others,—as the greatest of all benefits is that of living in a peaceable, moral, and well-governed community.

Knowing that you fully unite with me in these sentiments, I do not hesitate again to press upon your attentive consideration the subject of our schools and seminaries of learning. In pursuance of a resolution passed at your last session, I appointed a committee, charged with the duty of inquiring into their condition, and the best means of improving them. Their report, which has not yet been received, will probably be made during the present session; and I entertain the hope that it may greatly benefit the cause of education. There is reason to fear that the individual interest, in our Common Schools, which was formerly so observable among our citizens, has lately been declining. It would be natural, perhaps, that this should be the case, as, at an early period, these schools depended principally for their support upon the separate arrangements and voluntary contributions of each school district. And, as our schools have become, every year, more and more at the public charge, the necessity of such voluntary support would be less and less felt; and, possibly, the introduction and progress of a new system has been allowed to supplant the old one more rapidly than it should have done. If private interest in the subject has thus been withdrawn, only in proportion to the increase of the public fund even, the effect may have, and probably has, been unfavorable. Individual exertion, which springs from a sense of necessity, is active and zealous; and to render a system of support, in schools at the public expense, an adequate substitute for the voluntary system, it is indispensable that it should be accompanied by some general plan of public superintendence and management. Such a plan should embrace all that is essential to secure a perfect knowledge of the whole subject of education, as it exists throughout the State, a careful application of the school fund, and an adequate support of the necessary schools.

Several States have adopted systems similar to the one I recommend; and I would refer you particularly to that which exists in the State of Massachusetts, and to the reports which are annually made, under it, by an officer charged with the duty of their superintendence. I have been forcibly impressed with the utility of these reports, and, indeed, I am unable to perceive how they can be dispensed with, if our schools are to become objects of public care and support. Without them, it is difficult to understand how the public can ever be possessed of the knowledge necessary to their proper management.

TRUE AND FALSE DELICACY.

Above every other feature which adorns the female character, delicacy stands foremost within the province of good taste. Not that delicacy which is perpetually in quest of something to be ashamed of, which makes a merit of a blush, and simpers at the false construction its own ingenuity has put upon an innocent remark, (this spurious kind of delicacy is as far removed from good taste as it is from good feeling and good sense,) but that high-minded delicacy which maintains its pure and undeviating walk alike amongst women as in the society of men, which shrinks from no necessary duty, and can speak when required, with seriousness and kindness, of things at which it would be ashamed, indeed, to smile or to blush; that delicacy which knows how to confer a benefit without wounding the feelings of another, and which understands also how and when to receive one; that delicacy which can give alms without display, and advice without assuming, and which pains not the most humble or susceptible being in creation. This is the delicacy which forms so important a part of good taste, that, where it does not exist as a natural instinct, it is taught as the first principle of good manners, and considered as the universal passport to good society. Nor can this, the greatest charm of female character, if totally neglected in youth, ever be acquired in after-life. When the mind has been accustomed to what is vulgar or gross, the fine edge of feeling is gone, and nothing can restore it. It is comparatively easy, on first entering upon life, to maintain the page of thought unsullied, by closing it against every improper image; but when once such images are allowed to mingle with the imagination, so as to be constantly revived by memory, and thus to give their tone to the habitual mode of thinking and conversing, the beauty of the female character may, indeed, be said to be gone, and its glory departed.—*Mrs. Ellis's Daughters of England.*

Let the Bible hold the first place in every school. As to the manner of its use, it must be left with the teacher. He who, under such circumstances, undertakes to inculcate the distinctive tenets of any one denomination, abuses the trust confided to him. There are certain great principles, taught in that holy book, which are admitted by all Christian denominations among us to be essential. These truths should be studied and enforced; the moral precepts of the Bible should be inculcated; the government of the school, and all the intercourse of the teacher with his pupils, and of the pupils with each other, should be in accordance with the great law of love which pervades the sacred pages.—*R. B. Hubbard.*

Thoughtless Prayer.—"Let a man ask himself whether he really would have the thing he prays for; let him think, while he is praying for a spirit of forgiveness, whether, even at that moment, he is disposed to give up the luxury of anger. If not, what horrible mockery it is! To think that a man can find nothing better to do, in the presence of his Creator, than telling off so many words, alone with his God, and repeating his task like a child, longing to get rid of it, and indifferent to its meaning!"

TO THE SUN-DIAL

UNDER THE WINDOW OF THE HALL OF THE HOUSE OF REPRESENTATIVES OF THE UNITED STATES. BY JOHN QUINCY ADAMS.

Thou silent herald of Time's ceaseless flight!
Say, couldst thou speak, what warning voice were thine?
Shade, who canst only show how others shine!
Dark, sullen witness of resplendent Light!
In Day's broad glare, and when the noon-tide bright
Of laughing Fortune sheds the ray divine,
Thy ready favors cheer us,—but decline
The clouds of Morning and the gloom of Night.
Yet are thy counsels faithful, just, and wise;
They bid us seize the moments as they pass,—
Snatch the retrieveless sunbeam as it flies,
Nor lose one sand of Life's revolving glass,—
Aspiring still, with energy sublime,
By virtuous deeds, to give ETERNITY to TIME.

DEATH-BED OF HUMAN GREATNESS.—Clement V. during his feeble and profligate reign, amassed enormous riches by the sale of ecclesiastical benefices, and by other scandalous means. He had enriched his relations and his descendants, but he had not secured their gratitude. The moment that his death was announced in the papal palace, all its inmates rushed upon its treasures, as if they had been their lawful booty. Among his numerous household, not a single servant remained to watch the dead body of their master. The wax candles that lighted his bed of state fell upon the bed-clothes, and set them on fire. The flames spread over the whole apartment; but the palace and wardrobe were so plundered, that only a miserable cloth could be found to cover the half-burnt remains of one of the richest popes who had ever governed the church.—*Campbell's Petrarch.*

THE YOUTHFUL MIND.—"A straw will make an impression on the virgin snow; but let that snow remain but a short time, and a horse's hoof can hardly penetrate it. So it is with the youthful mind. A trifling word may make an impression on it, but after a few years, the most powerful appeals may cease to influence it. Think of this, ye who have the trainings of the infant mind, and leave such impressions thereon as will be safe for it to carry amid the follies and temptations of the world."

SCHOOL BOOKS.—An editor some where out west says that a schoolmaster in his neighborhood recommends to his scholars a very *fine* edition of *Combe* on the *head.* He says they have the organ of *inhabitiveness* very strongly developed.

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C

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